



## Antimicrobial Effect of *Opuntia Ficus-Indica* Extract on *Escherichia coli* Isolated from Patients with Urinary Tract Infection

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### Dear Editor-in-Chief

Urinary tract infection (UTI) is one of the public health problems worldwide, many organisms, such as viruses, and bacteria cause urinary tract infection, but bacteria are the most common (1, 2). The most important cause of UTI in more than 90% of cases is *Escherichia coli* particularly in women (3). With the increasing of microbial infections and drug resistance, the side effects of synthetic chemical drugs, the high cost of their preparation, the need for finding antimicrobials with high-efficacy against microorganisms causing UTI is inevitable today (4). The *Opuntia ficus-indica* belongs to Cactaceae family, a tropical and subtropical plant, and a medicinal herb which has traditionally been used for medical, therapeutic, and pharmaceutical use such as hepatoprotective anti-ulcerogenic, antioxidant, neuroprotective, and anticancer activities (5).

This study aimed to evaluate the efficacy of antimicrobial activity of ethanolic and ethyl acetate extracts of oral cactus on *E. coli* isolated from UTI. This observational study was conducted with easy sampling in 2018 on *E. coli* recovered from specimens collected from patients with UTI referred to treatment centers of Chalous City in Mazandaran, Iran.

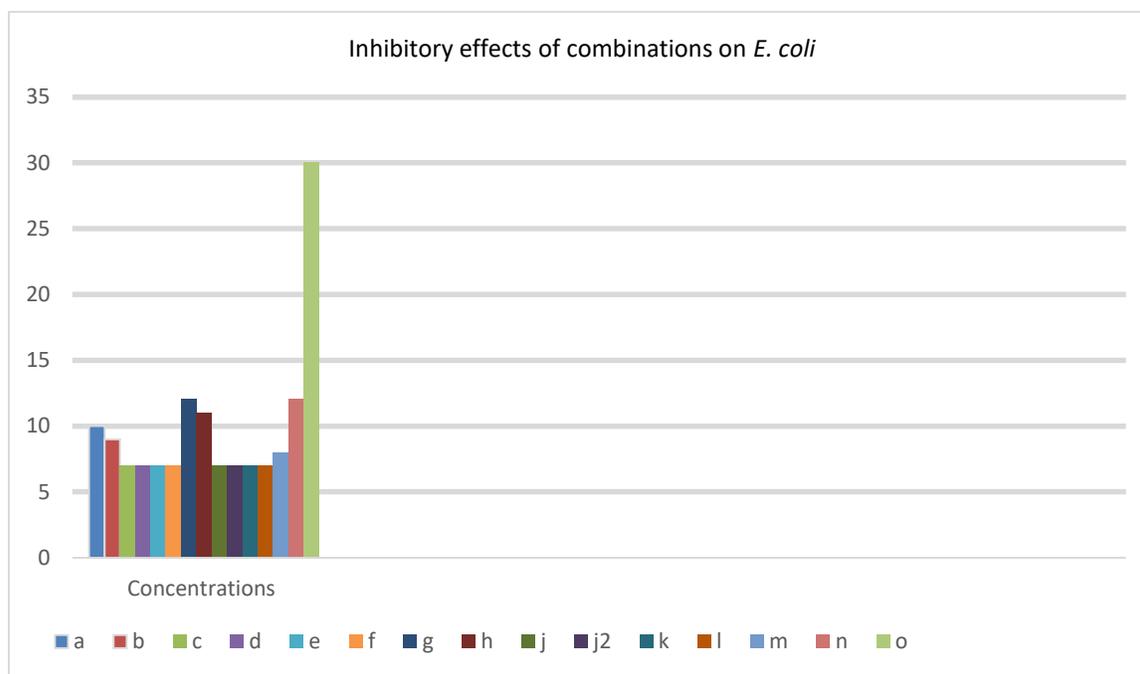
This plant was purchased from the Tajrish market in Tehran. At first, the plant samples were washed with distilled water, cleaned, and then dried for 4-5 days at ambient temperature, in a shade, away from light and moisture. Second, extraction was performed using Maceration method (6). Antibacterial effect of ethanolic and ethyl acetate extracts of *O. ficus-indica* plant was compared with the reference antibiotics (Valinomycin, Gentamicin, and Ampicillin) using Kirby Bauer disc diffusion method according to the CLSI (7), and inhibition zone diameter (mm) was measured. Then, data analysis was done using SPSS (Chicago, IL, USA) software and one-way ANOVA.

As shown in Fig.1, the inhibition zone diameter (mm) of *E. coli* under the impact of different concentrations of both ethanolic and ethyl acetate extracts and also selected antibiotic has a decreasing trend. In the different concentrations of ethyl acetate extract in comparison to reference antibiotics against *E. coli* were not significantly different in inhibition zone diameter in different concentrations. The ethanolic extract has more anti-*E. coli* activity than ethyl acetate extract ( $P=0.01$ ). As in concentrations of 100 and



25.26 mg/mL of extracts (both ethanolic and ethyl-acetate) had the highest and lowest values of the inhibition zone diameter. The maximum

non-growth diameter was associated with Gentamicin antibiotic.



**Fig. 1:** The inhibition zone diameter (mm) of *E. coli* under the impact of different concentrations of both ethanolic and ethyl-acetate extracts and also selected antibiotic. Note; a: ethyl-acetate (con: 100 mg/mL), b: ethyl-acetate (con: 75 mg/mL), c: ethyl-acetate (con: 50 mg/mL), d: ethyl-acetate (con: 25 mg/mL), e: ethyl-acetate (con: 12 mg/mL), f: ethyl-acetate (con: 6.5 mg/mL); g: ethanolic (con: 100 mg/mL), h: ethanolic (con: 50 mg/mL), i: ethanolic (con: 25 mg/mL), j: ethanolic (con: 12 mg/mL), k: ethanolic (con: 6.5 mg/mL), l: Ampicillin(10 µg), m: Valinomycin(10 µg), n: Gentamicin(10 µg)

Results showed that ethanolic extract of *O. ficus-indica* plant has more antimicrobial activity against *E. coli* isolated from patients with UTI. The ethyl acetate extract of cactus showed antibacterial activity on five food born bacteria (*Bacillus subtilis*, *Staphylococcus aureus subsp. aureus*, *Escherichia coli*, *Salmonella typhimurium*, and *Pseudomonas fluorescens*) (8-9). The antibacterial activity of methanol, ethanol, chloroform extracts of cladodes and skin fruit extracts of *O. ficus indica* against both gram-positive and gram-negative bacteria, might be attributed to the presence of various bioactive ingredients in the extracts (10).

In conclusion, ethyl acetate and ethanolic extracts of *O. ficus indica* showed antibacterial activity against *E. coli* recovered from patients with UTI.

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## Conflict of interest

The authors declare that there is no conflict of interest.

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